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THE MANAGEMENT OF A SEWAGE TREATMENT PLANT

General Principles Applicable
to Small Installations

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to all Installations

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THE MANAGEMENT OF A SEWAGE TREATMENT PLANT

THE MODERN sewage treatment works of today receives far more attention than did its neglected antecedent of even a decade ago. This is especially true of the relatively small installations. Notwithstanding this noteworthy progress, however, there is still room to improve appreciation of the function a municipal sewage treatment plant should perform. This lack of appreciation is oftentimes reflected, both in general and in detail, by lack of the provision of sufficient operating funds so that maximum service and returns may be received from the amounts available for distribution. Except in those instances where specific income is allocated to definite use, as where sewer service or rental charges are made, there is still the tendency and temptation to forget the sewage plant, since it is usually located outside the gates of the city, and is therefore less likely to come under the notice of the critical citizen and taxpayer.

In this connection it is pertinent to question whether or not the sewage plant should rank as a major municipal responsibility, along with water supply, streets, lighting, safety, and others duly recognized as important. That such is a growing trend is manifested by the increasing number of sewage plants designed, built, and operated as a credit to the community. The development of civic pride, the growing importance of sanitation as contributing to improved public health conditions, together with the fact that riparian owners are no longer content to tolerate the noisome odors and other undesirable effects of sewage decomposition, are factors in developing a consciousness that proper sewage disposal is indeed an important though still somewhat by-passed part of municipal business.

If, then, a sewage plant may be regarded as an integral part of municipal activities, how should its affairs be administered?

Four more or less correlated interests are directly concerned with sewage plant management, namely: the state; the municipal executive in whose department the plant is; the plant superintendent or supervisor; and the operators.

Sewage treatment works are installed usually to attain definite objectives, such as to protect a public water supply, bathing beach, or other recreational water against undue contamination; to safeguard waters against the killing of fish and the spoiling of drinking water supplies of cattle; and to prevent unsightliness, odors, and general nuisance attributable to uncontrolled sewage discharge.

The state is particularly concerned that the plant installed be adequate to meet its peculiar requirements and that it be operated in such manner as to accomplish its intended purpose. To this end the government official makes inspections, demands reports, and is either helpful or otherwise, depending upon whether he has an appreciative knowledge of the problems involved or acts merely as a policeman. Conferences on sewage treatment sponsored by state health departments have had marked influence in elevating the plane of sewage plant operation and management, not only in respect to the problems of the plant itself, but notably also in arousing a sense of responsibility in munic-

ipal officials. It is gratifying to observe that supervision on the part of the state is now directed largely toward improved management by constructive suggestions rather than to destructive criticism. Police tactics always put the plant superintendent on the defensive in an effort to elude and evade lapses, whereas a sympathetic attitude invites confidence and promotes co-operation.

Recently the newly appointed chairman of the sewer committee of a small town council admitted that he had never seen the sewage plant although it had been in service for some twenty years. Ten years ago in this same town he would have served his two years and remained undisturbed and uninformed, although the farmer through whose pasture the effluent flows might have registered several complaints. Today, however, when the plant at the state's insistence is being operated under the direction of a part-time technical supervisor, he is taken to the site, and the function and purpose of each of the several treatment units explained. In consequence he is more appreciative of the necessity for certain expenditures, the request for which in all probability would otherwise have been entirely ignored or else indefinitely postponed. Similar instances of better understanding between the resident operator and the uptown office are becoming more common, with the result that the sewage plant is regarded as a member of the municipal family and not treated as a poor relation. The importance of this factor in securing effective sewage plant operation and management cannot be too greatly emphasized.

Perhaps the most important link in the chain of sewage plant administration is the superintendent. The larger the plant the more essential it is to have a competent resident supervisor. To him falls the duty of carrying out policies formulated by state and municipality, and upon him rests the direct burden of producing maximum plant efficiency at minimum expense. Even the small or one-man plant is expected to give an accounting of methods pursued and results accomplished. At the larger plants where an engineer or chemist-superintendent is employed full time, much more is rightly expected, and it is to this class that some attention may be directed in consideration of detail of management.

The duties of a plant superintendent naturally fall into several classes: general policy; operating personnel; laboratory control; maintenance and upkeep; cost accounting; and records. It is obvious that there should be close cooperation between the superintendent and the executive who secures the appropriation. Between them should be established budget requirements and policies and every effort made to reach the goals set. By policy is meant decision as to general plan of procedure regarding political influence, wages, hours of labor, plant upkeep of both grounds and treatment devices, disposal of sludge cake whether by gift or by sale, and other matters of like import.

At this point it might be well to raise the question relative to the policy of plant beautification. There is no doubt of the growing popularity of beautifying sewage plant surroundings with attractive shrubbery and velvety lawns. In this policy we most heartily concur. On the other hand, caution must be observed so that normal plant functions are not neglected. Both are essential to effective operation, but beautiful lawns and flowering shrubs will not decrease the B.O.D. of a stream depleted by a poor effluent, although it might divert the nose from a somewhat ill-smelling settling tank. The question arises also whether it is not better for the interested citizen to find a park where he ex-

pects only a sewage plant, than to find a sewage plant where he expected to see only a park. It is difficult to hide the unsavory purposes of a sewage works even from the uninitiated, although it must be recognized that prejudices can be allayed if the surroundings are clean, attractive and generally respectable.

A sewage plant should have an operating personnel adequate in number and competent as to mental and physical ability. Politics or favoritism deserve no part. Capable men should be selected and assured tenure under good behavior and faithful service. Licensing of operators after due examination, both physical and mental, is to be most highly commended and urgently advocated. Overloading the payroll with loafers is fatal to discipline and often results in denying those who are willing to work a proper competence.

Every sewage plant is entitled to as much laboratory control as possible. The whole works may be regarded as a factory, producing an end product by stages through the agency of delicate machinery at each step. It is important to know just how each unit performs. To this end a laboratory well equipped as to apparatus and personnel should be utilized constantly. But here also a word of caution appears proper. It is obvious that a small plant operator cannot devote too much time to sampling and tests when other duties demand his attention. Also, on the larger plant the chemist-superintendent without an assistant is handicapped in supervising outside work if he is tied down to a laboratory bench or to a calculating machine. Routine laboratory analyses often lose their value because, in the effort to keep abreast of the work, there is no time to study results and govern the operating procedures accordingly. Wherever possible there should be a laboratory assistant trained to do the routine work, yet sufficiently appreciative of the results to call attention to irregularities so that operating procedures may be suitably adjusted.

In this connection we have observed startling inconsistencies in some reported results, particularly with respect to bulk solids. Appreciating fully the difficulties in obtaining representative samples, and having in mind the frailty of the personal equation, together with the inadequacy of laboratory procedure in certain determinations, such as volatile solids, it does not appear logical that solids should always be out of balance. With proper attention to details of sampling and technique of analysis, there seems to be no good reason why over a period of time results should not be consistent. It is difficult to understand why at the end of a year a report from one plant shows a gain in total sludge solids, whereas another shows an unaccounted-for loss of some 25 per cent. Similarly, a gas production of some 20 cu. ft. of gas per lb. of volatile matter destroyed in one plant appears inconsistent with only 10 or 11 cu. ft. as reported from another laboratory. Factors contributing to such discordant results require study and evaluation, and emphasize the necessity of basing final judgment on long-time results rather than on analyses covering relatively short intervals. Unless we can make laboratory work tell a true story it were better to devote that time to some other endeavor. However, it is our firm conviction that with proper attention to details of sampling, technique, and computation, correct results and reliable information can be secured.

The question arises to what extent experiment and research should be included in routine plant operation and management. Where personnel and funds are available, all efforts to improve old methods and develop new procedures and processes are most highly commended. However, the urge toward the unusual or new should not sidetrack the routine essential to keep the

old plant at peak performance. Little can be gained if the job at hand is neglected for the elusive bird in the bush.

Cost figures on the operation of sewage plants are often misleading and insufficient. The *Sewage Works Journal* of January 1932 carries a very comprehensive and complete report upon "Sewage Works Operating and Cost Records." To observe all the details there recommended, while desirable, is not always possible, especially with limited personnel, yet the basic outline should be followed. With most superintendents there is the tendency to show costs as low as possible. To do this, overhead is often omitted entirely, and special conditions in respect to free labor and other items are not always fully evaluated. In any event the gross operating cost, including overhead, labor, materials and supplies, should be included at going prices. Credits may then be deducted and the superintendent still receive acknowledgment for economies conceived and effected. If this be done, comparisons may be made without distortion due to local circumstances.

In sewage plant management, plant upkeep and maintenance are usually the first to suffer when funds are curtailed. It is relatively easy to put off until next year a needed coat of paint or some replacement where it is still possible to "get by." Such policy in the long run is expensive and leads to early total depreciation. Plant structures kept in repair and properly protected may have their useful life prolonged indefinitely. The matter of plant upkeep and maintenance is of major importance and a controlling factor not only in appearance but actual length of effective service.

Sewage plant records cannot be too detailed. A diary of daily events and happenings, while apparently inconsequential today, may be of major importance tomorrow. Records to be of value must be up to date. Not only chemical analyses, flow records and the like, but observations relative to wind, weather, odors or lack of odors, condition of receiving water, and anything pertinent to plant performance, should be duly recorded against the day of possible litigation, or for the benefit of those of the future who must plan extensions. The keeping of a complete up-to-date record of plant accomplishments is an essential part of a superintendent's duties and a prime essential to good management. Data should be recorded so that they may be converted to different bases such as per M.G., per capita, or other, depending upon the need in any given case.

When all is said and done, it is upon the plant attendant that the success or failure of sewage plant operation depends. Upon him rests the responsibility of detailed observations and measurements during routine work such as sampling, measuring sludge depths, recording temperatures, power readings, and numerous similar duties. To him the plant is entrusted during the night watches, and lapses in attention to detail may result not only in discordant plant results but frequently also in property damage and loss. It is essential, therefore, that the plant attendant be competent and trustworthy. A time clock cannot engender loyalty nor develop a sense of responsibility. This may be attained only by fair dealing and proper discipline.

The remarks made in this paper are not intended as a learned or detailed dissertation on sewage plant management, but rather to provoke thought and discussion to the end that sewage plant administration may be made effective in producing maximum benefits of sewage treatment.

Proper plant management is not vested in any single person or department.

It is a composite effort of state official, municipal executive, plant superintendent, and plant operator. Each has an important part, and when all are correlated, greatest effectiveness will be attained and the objectives desired from any plant are most likely to be achieved.

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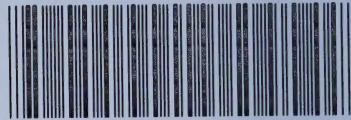
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